FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA

Inspiring Trust, Assuring Safe & Nutritious Food

HACCP – Hazard Analysis Critical Control Point

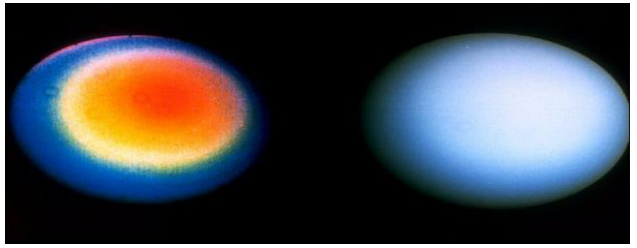
D.Venugopal
Deputy Director QA
FSSAI, New Delhi

Training Program for FPOs

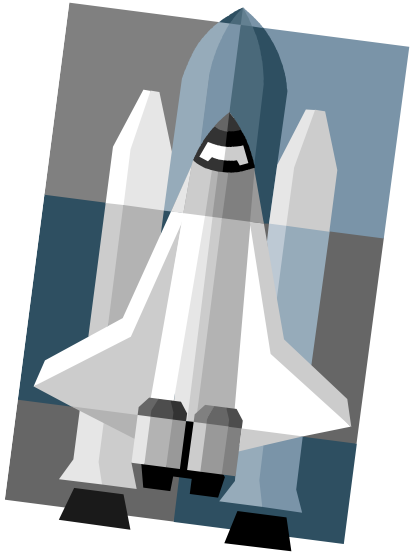
9th January 2026

ORIGIN OF HACCP

HACCP concept pioneered in the 1960s by the Pillsbury Company, the United States Army and the United States National Aeronautics and Space Administration (NASA).



NASA wanted a “ZERO DEFECTS” programme to guarantee the safety of the food that astronauts would consume in space.



Important Terminology

HACCP : is a system which identifies, evaluates and controls hazards that are significant for food safety.

Hazard: a biological, chemical or physical agent in food which causes an adverse health effect.

- **Conditions or contaminants in foods that can cause illness or injury.**
- **Process and Product Specific.**
- **Does NOT refer to undesirables such as:**

  •Insects •Bones •Hair •Filth •Spoilage •Economic Fraud

Hazard analysis: the process of collecting and evaluating information on hazards(significant or not) for food safety.

Terminology cont...

Critical Control Point (CCP): A step at which a food safety hazard is essential to prevent or eliminate or reduce it to an acceptable level.

Critical limit: A criterion which separates acceptability from unacceptability.

Corrective action: Any action to be taken when the results of monitoring at the CCP indicate a loss of control.

Terminology cont…

Validation: Obtaining evidence that the elements of the HACCP plan are effective.

Verification: The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

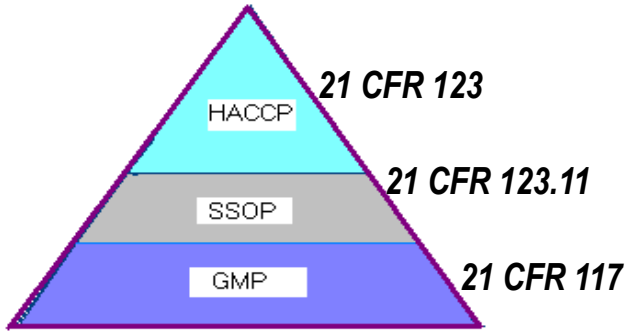
Importance/Benefits of HACCP

- A scientific approach
- Systematic process
- Focus on food safety
- Hazards identification and risk assessment
- Control of hazards
- Emphasis on prevention
- Reduction of end product testing
- Cost Effective (Reduce wastage/reprocess/delay in shipment)
- Image-enhancement Of Industry & Country
- Increased consumer and government confidence

❖Programs that must be in place BEFORE starting HACCP

❖Provides foundation for implementation of HACCP system as it is not a stand alone system

➢Procedures, including GMP and SSOP that address operational conditions in the processing plant and provide the foundation for the HACCP system .

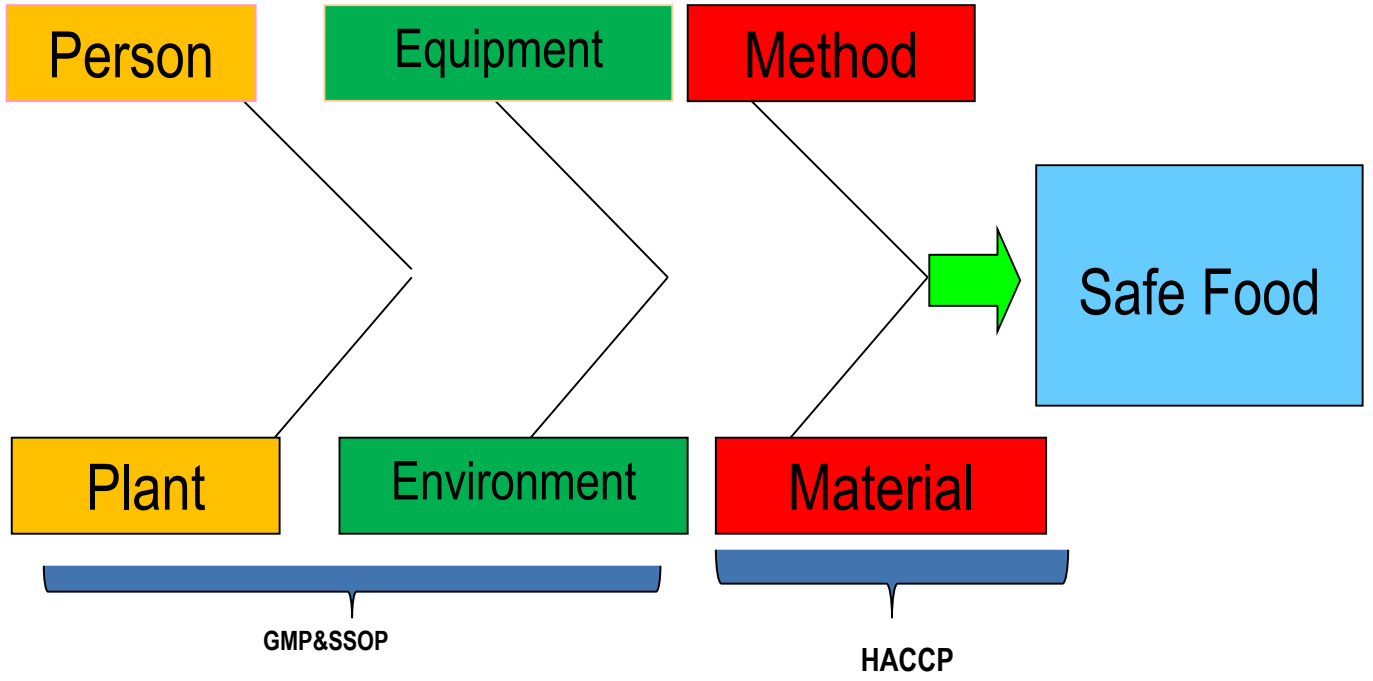


➢GMPs provide the foundation for the safe food supply.

➢SSOPs are steps or procedures that control certain in-plant conditions

Besides GMP, and SSOP, Traceability, Recall and Allergen management program must be in place for successful implementation of HACCP system.

Factors Responsible for production of safe food



Shall not be restricted to a paper programme

Shall be a programme in practice

Needs overall commitment from Management & every Employee

Developing a HACCP Plan

Five preliminary steps

1. Assemble the HACCP team
2. Describe the product and its distribution
3. Identify the intended use (e.g. cook before consume & intended consumer(e.g. general public)
4. Develop a Flow Diagram (i.e. Process Flow)
5. On site verification of flow diagram

Developing HACCP Plan Cont…

Seven Principles

* Hazard Identification & Analysis
* Determination of Critical Limits
* Determination of CCPs
* Establish Monitoring systems
* Establish CA if deviation occurs
* Establish verification system
* Establish Record Keeping

12 STEPS OF HACCP as per Codex

Assemble the HACCP Team

Describe the product

Identify intended use

Construct flow diagram

On-site verification of flow diagram

Conduct hazard analysis

Determine CCPs

Establish critical limit

Establish a monitoring system

Establish corrective action for deviations that may occur

Establish verification procedures

Establish record keeping and documentation

5 Preliminary steps

7 Principles

Step – 1: HACCP Team

a. It should be multidisciplinary Personnel e.g. Production, Sanitation, QA, food microbiology, Laboratory, Maintenance, Refrigeration etc.

b. Members should have specific knowledge and scientific & risk assessment expertise appropriate to the Product & Process.

c. A sense of ownership among those who must implement the plan.

d. The team may take assistance from outside experts who are knowledgeable in the potential biological, chemical and/or physical hazards associated with the product and the process.

e. Experts who are knowledgeable in the food process should either participate or verify the completeness of the hazard analysis, identify potential hazards, recommend controls, critical limits, and procedures for monitoring, appropriate corrective action and verification.

Step – 2: Describe the product

a. This consists of a general description of the food, ingredients, and processing methods.

b. Identify the market name & Scientific name of the fishery product. (e.g. Vanammei shrimps- L. Vanammei)

c. Fully describe the finished product (e.g. Raw IQF peeled deveined Vanammei shrimps

d. Describe the packaging type (e.g. vacuum pack, paper board, aluminum can)

e. Describe the method of distribution & storage (e.g. whether the food is to be distributed frozen, refrigerated, or at ambient temperature

Product Description form

Acceptable Market name & Species	Where Product Is Purchased (Source)			How Product Is Received				How Product Is Stored				How Product Is Shipped				How Product Is Packaged		Intended Use			Intended Consumer	
	Fisherman	Fish Farm	Processor/Dealer	Refrigerated	Iced	Frozen	Shelf-Stable	Refrigerated	Iced	Frozen	Shelf-Stable	Refrigerated	Iced	Frozen	Shelf-Stable	Air Packed	Reduced-Oxygen/ Vacuum Packed	Raw, to be cooked	Raw, RTE	Cooked. RTE	General-Public	At-risk Population

Step – 3: Identify the intended use

a. How the product will be used by the consumer (e.g. to be fully cooked before consumption)

b. Who will be the intended user (e.g. general public, another processing facility)

Step – 4: Develop a flow diagram

a. Sequence of all the steps involved in the processing of F&FP and its ingredients starting from receiving to distribution.

b. The purpose is to provide a clear, simple outline of the steps involved in the process.

c. The scope of the flow diagram must cover the steps in the process which are directly under the control of the establishment.

d. The flow diagram need not be as complex as engineering drawings. A block type flow diagram is sufficient .

Step – 5: On-site verification of flow diagram

To ensure Accuracy, completeness i.e. all major process operations are identified.

The HACCP team should perform an on-site review of the operation to verify the accuracy and completeness of the flow diagram.

Modifications should be made to the flow diagram as necessary and documented.

Step – 6: Hazard Analysis

Hazard is a biological, chemical or physical agent that is reasonably likely to cause illness or injury in the absence of its control. (safety point of view)

Conditions or contaminants in foods that can cause illness or injury.

Does NOT refer to undesirables such as: Insects/Bones /Hair/Filth/Spoilage/Economic Fraud

Hazard analysis must be for the raw materials, ingredients , process at each step, product storage and distribution, final preparation and its use by the consumer.

Type of Hazards

Biological Hazards

Spore (C. botulinum, L.monocytogenes)

Bacteria (Salmonella , V. cholerae)

Parasites (Nematodes, Flukes)

Physical Hazards: Metal & Glass

Chemical hazards

Natural	Added	From Packages
Allergens	Heavy Metals	Vinyl chloride
Aflatoxins	Pesticides	Printing Ink
PSP	Antibiotics	Adhesive
DSP	Food Additives	Lead
Ciguatoxin	Lubricants	
	Detergents / Sanitizers	

Five Steps in a Hazard Analysis

1) Listing of hazards: Brain storming session to identify product related and process related hazards

- Review RM, ingredients to be used, process(activities) at each step, equipment to be used, the final product, method of storage, distribution, intended use and consumers of the product, etc

2) Identify potential food safety hazards

(What it causes if not controlled)

3) Determine if the hazard is significant

(Reasonably likely to occur)

4) Justify the decision (Refer decision tree)

5) Identify control measure(s)

1. Material related

- Environmental chemicals, Aquaculture drugs & toxins)
- RM (Scombroids - Histamine; Bivalves - Natural toxin Aquaculture - Antibiotics ; Cephalopods - Cadmium)

2. Process related (Pathogens, Undeclared allergens, Undeclared additives, Metal inclusion)

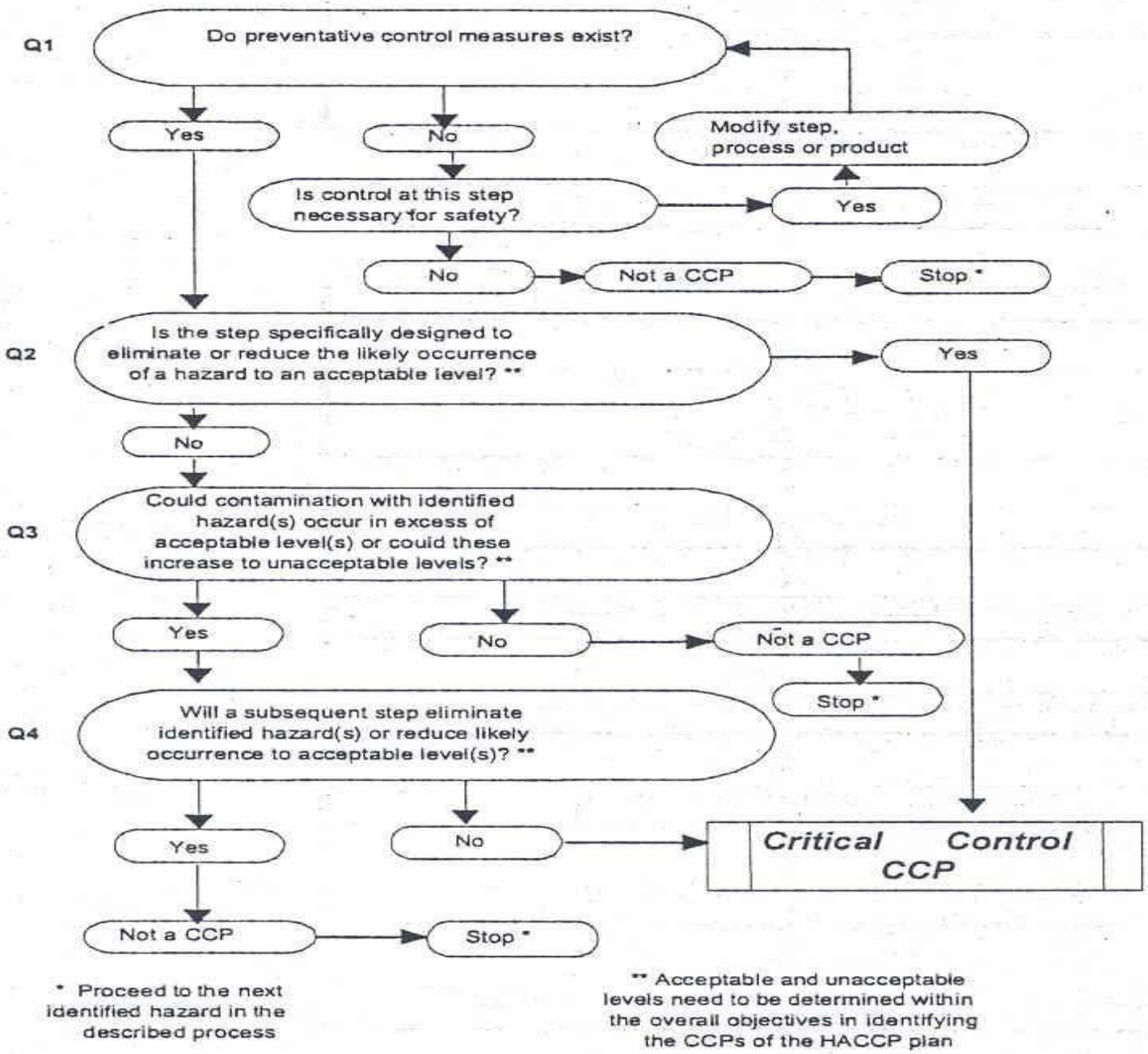
a) Method (Pasteurization/Cooking - Survival of pathogen)

b) Packaging (Vacuum packing - C. botulinum toxin)

Step – 7: Identify CCPs

- By using decision tree, determine whether it is necessary to exercise control at that step to prevent/eliminate/reduced to acceptable level the hazard.
- For every significant potential hazard, there must be at least one CCP.
- One hazard may be controlled at more than one CCP.
- One CCP can control more than one hazard.
- Different facilities preparing similar food items can differ in the hazards identified and CCPs . This can be due to differences in each facility's layout, equipment, selection of ingredients, processes employed.

Decision Tree


Q1
Do preventative control measures exist?
Yes
No
Modify step, process or product
Is control at this step necessary for safety?
Yes
No
Not a CCP
Stop *
Q2
Is the step specifically designed to eliminate or reduce the likely occurrence of a hazard to an acceptable level? **
Yes
No
Q3
Could contamination with identified hazard(s) occur in excess of acceptable level(s) or could these increase to unacceptable levels? **
Yes
No
Not a CCP
Stop *
Q4
Will a subsequent step eliminate identified hazard(s) or reduce likely occurrence to acceptable level(s)? **
Yes
No
Critical Control CCP
Not a CCP
Stop *
* Proceed to the next identified hazard in the described process
** Acceptable and unacceptable levels need to be determined within the overall objectives in identifying the CCPs of the HACCP plan

Step – 8: Establish Critical Limits (CL)

- ✓ Identify the max or min value to which a parameter of the process must be controlled in order to control the hazard.
- ✓ The value of CL shall be fixed such a way that if not met then safety of product may be questionable.
- ✓ It should not be more restrictive as a result corrective action is required to be taken when no safety concern actually exist.
- ✓ Also it should not be too loose as a result unsafe product will reach consumer
- ✓ Specific, Measurable, Achievable, Relevant, and Time-Bound.

Step – 8: Establish Critical Limits (CL) CL cont…

- A critical limit is used to distinguish between safe and unsafe operating conditions at a CCP. Critical limits should not be confused with operational limits which are established for reasons other than food safety.
- Each CCP will have one or more control measures.
- Each control measure has one or more CL.
- CL must be scientifically based.
- e.g. Cooker temp and Time of cooking(belt speed) varies with thickness(Grade) & Composition (Variety) etc

Step – 9: Establish Monitoring Procedures

- Monitoring is a planned sequence of observations to assess whether a CCP is under control.

Main purposes:

a. Facilitates tracking of the operation. If it indicates that there is a trend towards loss of control, then action can be taken to bring the process back into control before a deviation from CL.

b. Used to determine when there is loss of control and a deviation occurs at a CCP.

c. Provides written documentation for use in verification

- Continuous monitoring is always preferred when feasible.
- Monitoring procedures need to be rapid as they relate to on-line/real-time processes.
- Monitoring equipment must be calibrated for accuracy.

Step – 9: Establish Monitoring Procedures.. cont…

- Monitoring procedure should answer four questions:
  1. What will be monitored 2. How will be monitored
  3. How often will be monitored (frequency) 4. Who will monitor
- CL should directly relate to parameters to be monitored. e.g. Monitor temp of cooker & belt speed not the internal temp of product.
- Even though continuous recording, the paper/electronic record should be periodically checked to determine whether deviations occurred or not.
- Individuals must be trained in the monitoring technique and must be unbiased in monitoring and reporting. He/she should be trained in procedures to follow when there is a trend towards loss of control for taking proper action in a timely manner to bring the process under control.
- All records of CCP monitoring should be dated and signed by the person doing the monitoring.

Step – 10: Establish Corrective Action Procedures

- CA must be taken whenever there is a deviation from CL
- Pre-determined CA helps employees to follow in the event of deviation
- Appropriate CA should include following elements
  - a. Disposition of unsafe product and ensure it does not reach consumer
  - b. Find out the cause of deviation and correct
  - c. Record the CA that have been taken
- Individuals having thorough understanding of the process, product and HACCP plan should be assigned to oversee the corrective actions.
- If deviation occurs repeatedly, then adequacy of that CCP shall be re-assessed.

Step – 11: Establish Verification Procedures

- Verification procedure shall ensure that HACCP plan is
  1. Adequate to control hazard
  2. Consistently being followed
- Frequency of verification must be mentioned in plan
- It is done by

@Validation (process & equipment)

@Calibration of equipments used for CCP monitoring

@End product testing

@Target sampling & testing

@Review of monitoring & CA

@Verification of records

Verification Schedule

Activity	Frequency
Initial Validation of HACCP Plan	Prior to and during initial implementation of plan
Subsequent validation of HACCP Plan	When changes in CL, Process, Equipment, any system failure (e.g. foreign rejection/complain)
Verification of CCP Monitoring as Described in the Plan	According to HACCP Plan (e.g. once per shift)
Review of Monitoring/ CA records to show compliance with the Plan	Monthly
Comprehensive verification of HACCP system	Yearly

Content of Verification Reports

- The person responsible for administering and updating the HACCP plan.
- The records associated with CCP monitoring.
- Direct recording of monitoring data of the CCP during operation.
- Calibration and working status.
- Corrective actions for deviations.
- Sampling and testing methods used to verify that CCPs are under control.
- Modifications to the HACCP plan.
- Training and knowledge of individuals responsible for monitoring CCPs.
- Validation activities.

Step – 12: Establish Recordkeeping Procedures

- List the records that will be used for monitoring, corrective action, verification etc
- Record shall contain actual values/observation during monitoring
- Establishment name and address must be on all CCP records.
- What is the difference between record and document?

List of important HACCP Records

- ✓ Ingredients for which CL have been established.
- ✓ Supplier certification records for compliance of an ingredient with a CL.
- ✓ Processor audit records verifying supplier compliance.
- ✓ Storage records (T/T) when ingredient storage is a CCP.
- ✓ Processing, storage and distribution records.
- ✓ Information that establishes the efficacy of a CCP to maintain product safety.
- ✓ Data establishing the safe shelf life of the product.
- ✓ Records indicating compliance with critical limits when packaging materials, labeling or sealing specifications are necessary for food safety.
- ✓ Monitoring records.
- ✓ Verification records.
- ✓ Deviation and corrective action records.
- ✓ Employee training records pertaining to CCPs and the HACCP plan.
- ✓ Documentation of the adequacy of HACCP plan from a HACCP expert.

*****

HAWS & PLAN

- **Cooked IQF Aquaculture Shrimps**

HAZARD ANALYSIS WORK SHEET

Product Description: Cooked IQF Aquaculture Shrimps
Method of Distribution & Storage: Frozen at /below - 18 ^{0} C; Intended Use: General Public

(1) Ingredient/ Processing Step	(2) Identify Potential Hazards	(3) Are any Potential food Safety hazards significant (Yes/No)	(4) Justify your Answer for column 3	(5) What preventive Measure(s) can be applied to prevent the significant hazards?	(6) Is this step a Critical Control Point?(Yes/No)
Receiving	1. Environmental chemical 2. Aquaculture drugs 3. Allergens 4. Food intolerance substance 5. Pathogenic bacteria growth (Temp abuse) 6. Pathogenic bacterial survival 7. Metal fragments				

Hazard: **Environmental contaminants/ Aquaculture drugs**

Control strategy:

- Farm visit
- Supplier’s Declaration
- Testing

HACCP PLAN

Note: Control strategy: Farm visit

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Receiving	Chemical contaminants /drugs	Farm audit report available before harvest indicating farm is away from agriculture area & / non usage of chemical/drugs during culture and test report of inputs are free from aqua drugs							

HACCP PLAN

Note: Control strategy: Supplier certification

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Receiving	1.Chemical contaminants/ drugs	Supplier's guarrantee accompanying each lot indicating farm is away from agriculture area & / non usage of chemical/drugs during culture and after harvest							

HACCP PLAN

Note: Control strategy: Chemical contaminant Testing

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Receiving	1.Chemical contaminants/pesticides	ND/ <MRL of the contamints likely to occur							

HACCP PLAN

Note: Control strategy: Residue Testing

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Receiving	Banned drugs	Valid PHT (harvest within validity period and compliant test result							
		No shrimps contain banned drugs							

Hazard : Sulphite residue

Control strategy:

- **Supplier's Declaration**
- **Testing**
- **Labeling**

HACCP PLAN

Note: Control strategy: Supplier certification

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Receiving	Undelared sulphiting agents	Supplier's guarrantee accompanying each lot stating that sulphiting agent were not used							

HACCP PLAN

Note: Control strategy: RM testing

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Receiving	Undelared sulphiting agents	Shrimps must not contain ≤ 10 ppm sulphiting agent							

HACCP PLAN

Note: Control strategy: Labeling of finished product

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Labeling of finished product	Undelared sulphiting agents	All finished product packages must bear labels that contain sulphiting agent							

Hazard : Pathogenic bacteria survival

Control strategy:

- Cooking

HACCP PLAN

Note: Control strategy: Cooking

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Cooking	Pathogenic bacteria survivial	Min cooking time as per validation chart Min cooker temp at 98^{0}C							

Hazard: **Metal fragments**

Control strategy:

Metal detection

HACCP PLAN

Note: Control strategy: Metal Detection

Critical Control Points (CCP)	Significant Hazard	Critical Limits	Monitoring				Corrective Actions(s)	Records	Verification
			What	How	Frequency	Who			
Metal Detection	Metal fragments	Fe 1.5mm Non-Fe 2mm SS 2mm							
		No detectable metal fragments in products							

Thank You